

1 **All Pending Claims:**

2  
3 **(in Clear Form, in accordance with 37 CFR §1.121):**

4  
5 Please amend claims 1-3, 22, 26, 33, and 34 and add claims 36-42 as indicated  
6 below:

7  
8 1. **(AMENDED)** An audio watermarking system comprising  
9 a pattern generator to generate both a strong watermark and a weak  
10 watermark; and  
11 a watermark insertion unit to selectively choose insertion of the strong  
12 watermark or the weak watermark into segments of the audio signal.

13  
14 2. **(AMENDED)** An audio watermarking system comprising:  
15 a pattern generator to generate both a strong watermark and a weak  
16 watermark; and  
17 a watermark insertion unit to insert the strong watermark and the weak  
18 watermark into the audio signal,  
19 wherein the watermark insertion unit selectively inserts the strong  
20 watermark or the weak watermark into segments of the signal according to an  
21 audible measure of the segments.

22  
23 3. **(AMENDED)** An audio watermarking system comprising:  
24 a pattern generator to generate both a strong watermark and a weak  
25 watermark;

1 a watermark insertion unit to insert the strong watermark and the weak  
2 watermark into the audio signal;

3 a processor to determine a hearing threshold for the audio signal; and

4 the watermark insertion unit inserts the strong watermark when the signal  
5 exceeds the hearing threshold and insert the weak watermark when the signal falls  
6 below the hearing threshold.

7  
8 4. An operating system comprising an audio watermarking system as  
9 recited in claim 1.  
10

11 5. An audio watermark encoding system comprising:

12 a converter to convert an audio signal into magnitude and phase  
13 components;

14 a mask processor to determine a hearing threshold for corresponding  
15 magnitude components;

16 a pattern generator to generate both a strong watermark and a weak  
17 watermark; and

18 a watermark insertion unit to selectively insert one of the strong watermark  
19 or the weak watermark into the audio signal based on whether the magnitude  
20 components exceed or fall below the hearing threshold.  
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1           6.    An audio watermark encoding system as recited in claim 5, wherein  
2 the watermark insertion unit inserts the strong watermark when the magnitude  
3 component exceeds the hearing threshold and inserts the weak watermark when  
4 the magnitude component falls below the hearing threshold.

5  
6           7.    An audio watermark encoding system as recited in claim 5, wherein  
7 the watermark insertion unit inserts the strong watermark when the magnitude  
8 component exceeds the hearing threshold by a predetermined amount and inserts  
9 the weak watermark when the magnitude component falls below the hearing  
10 threshold by the predetermined amount.

11  
12           8.    An audio watermark encoding system as recited in claim 7, wherein  
13 the watermark insertion unit foregoes inserting the strong watermark or the weak  
14 watermark when the magnitude component lies within the predetermined amount  
15 above and below the hearing threshold.

16  
17           9.    An audio encoding system comprising:  
18 an audio watermark encoding system as recited in claim 5; and  
19 a compression unit, wherein the compression unit and the audio watermark  
20 encoding system both utilize the magnitude components.

21  
22           10.   An operating system comprising an audio watermark encoding  
23 system as recited in claim 5.  
24  
25

1           11.    A watermark insertion unit, comprising:  
2           an input to receive frequency magnitude components of an audio signal,  
3           hearing thresholds derived from the magnitude components, strong watermark  
4           values, and weak watermark values; and  
5           multiple insertion operators for selectively combining the magnitude  
6           components and one of the strong watermark values or the weak watermark values  
7           depending upon whether the magnitude components exceed or fall below the  
8           hearing thresholds.

9  
10           12.   An audio watermark detection system, comprising:  
11           a synchronization module to determine which portion of a watermarked  
12           audio signal might contain a watermark; and  
13           a correlation module to detect whether a strong watermark and a weak  
14           watermark is present in the portion of the watermarked audio signal.

15  
16           13.   An audio watermark detection system as recited in claim 12,  
17           wherein the correlation module computes a correlation value from the  
18           watermarked audio signal and the strong watermark that tends toward a first value  
19           when the strong watermark is present and a second value when the strong  
20           watermark is not present.

1           14. An audio watermark detection system as recited in claim 12,  
2 wherein the correlation module computes a correlation value from the  
3 watermarked audio signal and the weak watermark that tends toward a first value  
4 when the weak watermark is present and a second value when the weak watermark  
5 is not present.

6  
7           15. An audio watermark detection system as recited in claim 12,  
8 wherein the correlation module computes a correlation value from the  
9 watermarked audio signal and one of the strong watermark or the weak  
10 watermark, the correlation module determining that said one strong watermark or  
11 weak watermark is present when the correlation value exceeds a predetermined  
12 threshold plus a random amount.

13  
14           16. An operating system comprising an audio watermark detection  
15 system as recited in claim 12.

16  
17           17. An audio watermark detection system comprising:  
18 a converter to convert a watermarked audio signal into magnitude and  
19 phase components;  
20 a mask processor to determine a hearing threshold for corresponding  
21 magnitude components;  
22 a pattern generator to generate both a strong watermark and a weak  
23 watermark; and  
24 a watermark detector to detect presence of the strong watermark and the  
25 weak watermark in the audio signal.

1  
2       **18.**   An audio watermark detection system as recited in claim 17,  
3 wherein the watermark detector computes correlation values from the  
4 watermarked audio signal and each of the strong watermark and the weak  
5 watermark and detects the presence of the strong watermark and the weak  
6 watermark based on whether the correlation values exceed a predetermined  
7 threshold.

8  
9       **19.**   An audio watermark detection system as recited in claim 17, further  
10 comprising:

11       a random operator for generating a random value; and

12       the watermark detector computes correlation values from the watermarked  
13 audio signal and each of the strong watermark and the weak watermark and  
14 detects the presence of the strong watermark and the weak watermark based on  
15 whether the correlation values exceed a predetermined threshold plus the random  
16 value.

17  
18       **20.**   An audio decoding system comprising:

19       an audio watermark detection system as recited in claim 17; and

20       a decompression unit, wherein the decompression unit and the audio  
21 watermark detection system both utilize the magnitude components.

22  
23       **21.**   An operating system comprising an audio watermark detection  
24 system as recited in claim 17.  
25

1           **22. (AMENDED)**     An     audio     watermarking     architecture,  
2 comprising:

3           a watermark encoding system to selectively choose insertion of a strong  
4 watermark or a weak watermark into segments of an audio signal; and

5           a watermark detecting system to detect a presence of the strong watermark  
6 or the weak watermark in the segments of the audio signal.

7  
8           **23.**     An audio watermarking architecture as recited in claim 22, wherein  
9 the watermark encoding system resides at a content producer to watermark  
10 original audio content and the watermark detecting system resides at one or more  
11 clients to detect the watermarks and play the original audio content.

12  
13           **24.**     An audio watermarking architecture as recited in claim 22, wherein  
14 the watermark encoding system comprises:

15           a converter to convert the audio signal into magnitude and phase  
16 components;

17           a mask processor to determine a hearing threshold for corresponding  
18 magnitude components;

19           a pattern generator to generate both the strong watermark and the weak  
20 watermark; and

21           a watermark insertion unit to selectively insert one of the strong watermark  
22 or the weak watermark into the audio signal based on whether the magnitude  
23 components exceed or fall below the hearing threshold.  
24  
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1           25.    An audio watermarking architecture as recited in claim 22, wherein  
2 the watermark detecting system comprises:

3           a converter to convert a watermarked audio signal into magnitude and  
4 phase components;

5           a mask processor to determine a hearing threshold for corresponding  
6 magnitude components;

7           a pattern generator to generate both a strong watermark and a weak  
8 watermark; and

9           a watermark detector to detect presence of the strong watermark and the  
10 weak watermark in the audio signal.

11  
12           26.    (AMENDED)    A method for watermarking an audio signal,  
13 comprising:

14           watermarking a first portion of the audio signal with a strong watermark;  
15 and

16           watermarking a second portion of the audio signal with a weak watermark,  
17 wherein the first and second portions are distinguishable.

18  
19           27.    A method for watermarking an audio signal, comprising:

20           comparing samples of the audio signal to a hearing threshold;

21           watermarking samples exceeding the hearing threshold with a strong  
22 watermark; and

23           watermarking samples falling below the hearing threshold with a weak  
24 watermark.



1           **28.**    A method as recited in claim 27, wherein the watermarking samples  
2 comprises:

3           watermarking samples exceeding the hearing threshold plus a buffer value  
4 with a strong watermark;

5           watermarking samples falling below the hearing threshold by less than the  
6 buffer value a with a weak watermark; and

7           leaving samples lying within the buffer value above and below the hearing  
8 threshold without a watermark.

9  
10           **29.**    A method as recited in claim 27, further comprising detecting the  
11 strong watermark and the weak watermark in the audio signal.

12  
13           **30.**    A method as recited in claim 29, wherein the detecting comprises  
14 computing a correlation value from the audio signal and the strong watermark, the  
15 correlation value tending toward a first value when the strong watermark is present  
16 and a second value when the strong watermark is not present.

17  
18           **31.**    A method as recited in claim 29, wherein the detecting comprises  
19 computing a correlation value from the audio signal and the weak watermark, the  
20 correlation value tending toward a first value when the weak watermark is present  
21 and a second value when the weak watermark is not present.

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23           **32.**    A method as recited in claim 27, further comprising:  
24           computing a correlation value from the audio signal and one of the strong  
25 watermark or the weak watermark; and

1 determining that said one strong watermark or weak watermark is present  
2 when the correlation value exceeds a predetermined threshold plus a random  
3 amount.

4  
5 **33. (AMENDED)** A method comprising:  
6 selectively encoding portions of an audio signal with a strong watermark or  
7 a weak watermark; and  
8 detecting a presence of the strong watermark and the weak watermark in  
9 the audio signal.

10  
11 **34. (AMENDED)** A computer readable medium having computer  
12 executable instructions for:  
13 watermarking a first portion of an audio signal with a strong watermark;  
14 and  
15 watermarking a second portion of the audio signal with a weak watermark,  
16 wherein the first and second portions are distinguishable.

17  
18 **35.** A computer readable medium having computer executable  
19 instructions for:  
20 comparing samples of an audio signal to a hearing threshold;  
21 watermarking samples exceeding the hearing threshold with a strong  
22 watermark; and  
23 watermarking samples falling below the hearing threshold with a weak  
24 watermark.

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2  
3 36. An audio watermarking system comprising:

4 a pattern generator to generate both a strong watermark and a weak  
5 watermark; and

6 a watermark insertion unit to insert the strong watermark and the weak  
7 watermark into the audio signal,

8 wherein the watermark insertion unit selectively choose insertion of the  
9 strong watermark or the weak watermark into segments of the signal according to  
10 an audible measure of the segments.  
11

12 37. An audio watermarking system comprising

13 a pattern generator to generate both a strong watermark and a weak  
14 watermark; and

15 a watermark insertion unit to insert of the strong watermark into one or  
16 more first segments of the audio signal and to insert of the weak watermark into  
17 one or more second segments of the audio signal, wherein the first and second  
18 segments are distinguishable.  
19

20 38. An audio watermarking system as recited in claim 37, wherein the  
21 watermark insertion unit selectively chooses segments for insertion of the  
22 watermarks according to an audible measure of the segments.  
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1           39.    An audio watermarking system as recited in claim 37, wherein the  
2 watermark insertion unit selectively chooses segments for insertion of the strong  
3 watermark according to an audible measure of the segments.  
4

5           40.    An audio watermarking system as recited in claim 37, wherein the  
6 watermark insertion unit selectively chooses segments for insertion of the weak  
7 watermark according to an audible measure of the segments.  
8

9           41.    An audio watermarking system as recited in claim 37, further  
10 comprising:  
11

12           a processor to determine a hearing threshold for segments of the audio  
13 signal; and  
14

15           the watermark insertion unit inserts the strong watermark into a segment  
16 when the signal of that segment exceeds the hearing threshold and insert the weak  
17 watermark into a segment when the signal of that segment falls below the hearing  
18 threshold.  
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20           42.    An operating system comprising an audio watermarking system as  
21 recited in claim 37.  
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